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ABSTRACT

Data from the 1980 High School and Beyond (HSB) study are used to examine the variables associated with the grades that college-bound high school sophomores received in English, algebra, and geometry courses. Special concerns included determining if gender differences in high school grades could be explained, and how teachers' perceptions of students, student characteristics, and HSB test scores were related to grades. A model of factors that might explain grades was developed that includes student background and characteristics, attitudes, curriculum, educational aspirations, school behaviors, and scores on HSB tests. The full models explained 46% of variance in English grades, 42% in algebra, and 44% in geometry. The full models tended to explain more variance in males' than females' grades. After controlling for all the variables in the full models, a significant association between gender and grades remained for English and algebra 1, but no such association was found for algebra 2 or geometry. Teacher perceptions were also significantly associated with gender, suggesting gender-related expectations for students. Two figures and 25 tables present study findings. (Contains 36 references.) (SLD)

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College Board Report No. 94-3

Gender Differences in High School Grades: An Exploratory Study

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Gender Differences in High School Grades: An Exploratory Study

RUTH B. EKSTROM

College Entrance Examination Board, New York, 1994

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Contents

Abstract 1

Introduction 1

Conceptual Model 3
- Subjects 4
- Method 4

Descriptive Analysis 5
- Grades 5
- Test Scores 5
- Teacher Comment File 6
- Students' Attitudes and Behaviors 7

Relational Analysis 10
- English Teachers' Comments 11
- English Grades 12
- Mathematics Teachers' Comments 15
- Algebra Grades 17
- Geometry Grades 18
- Teachers' Comments, Test Scores, and Grades 20

Discussion and Conclusions 21

References 26

Appendix: Alternative Analysis 28

Figures
1. Gender and grades: Conceptual model. 4
2. Analytical model of factors affecting high school grades. 10

Tables
1. English and Math Grades (Weighted): Means and Standard Deviations 5
2. High School and Beyond Achievement Test Scores (Weighted): Mean Number of Items Correct and Standard Deviations (Except for Verbal Composite, Which Is a Standardized Score) 6
3. Correlations Between High School and Beyond Tested Achievement and English and Math Grades of Male and Female Students 6
4. English Teachers' Comments About Students (Percentages) 6
5. Math Teachers' Comments About Students (Percentages) 7
6. Correlations Between Teachers' Comments Composite and English and Math Grades of Male and Female Students 7
7. Attitudes and Behaviors as Reported on High School and Beyond Student Questionnaire: Means and Standard Deviations 7
8. Correlations of Background Characteristics, Attitudes, and Behaviors with English, Algebra, and Geometry Grades of Male and Female Students 8
9. Correlations Between Student Background Characteristics, Attitudes, Behaviors, Tested Achievement, and Teachers' Comments Composites 9
10. Multiple Correlations (Squared) of English Teachers' Comments Composite Regressed on Blocks of Predictors 11
11. Standardized and Raw Regressions of Gender on English Teachers' Comments Composite for Each Model 12
12. Full Model for English Teachers' Comments Composite for Males and Females: Standardized and Raw Regression Weights 12
13. Multiple Correlations (Squared) of English Grades Regressed on Blocks of Predictors 13
14. Standardized and Raw Regressions of Gender on English Grades for Each Model 13
15. Full Model for English Grades for Males and Females: Standardized and Raw Regression Weights 14
16. Multiple Correlations (Squared) of Math Teachers' Comments Composite Regressed on Blocks of Predictors 15

17. Standardized and Raw Regressions of Gender on Math Teachers' Comments Composite for Each Model 15

18. Full Model for Math Teachers' Comments Composite for Males and Females: Standardized and Raw Regression Weights 16

19A. Multiple Correlations (Squared) of Algebra 1 Grades Regressed on Blocks of Predictors 17

19B. Multiple Correlations (Squared) of Algebra 2 Grades Regressed on Blocks of Predictors 17

20A. Standardized and Raw Regressions of Gender on Algebra 1 Grades for Each Model 18

20B. Standardized and Raw Regressions of Gender on Algebra 2 Grades for Each Model 18

21A. Full Model for Algebra 1 Grades for Males and Females: Standardized and Raw Regression Weights 19

21B. Full Model for Algebra 2 Grades for Males and Females: Standardized and Raw Regression Weights 20

22. Multiple Correlations (Squared) of Geometry Grades Regressed on Blocks of Predictors 21

23. Standardized and Raw Regressions of Gender on Geometry Grades for Each Model 21

24. Full Model for Geometry Grades for Males and Females: Standardized and Raw Regression Weights 22

25. Summary of Standardized Regressions of Teachers' Comments and Tested Achievement on Grades 22

Abstract

This study used the 1980 High School and Beyond data set to examine the variables associated with the grades that college-bound high school sophomores received in English, algebra, and geometry courses. Special concerns included determining if gender differences in high school grades could be explained and how teachers' perceptions of students, student characteristics, and High School and Beyond test scores were related to grades. A model of factors that might affect grades was developed; it included students' background characteristics, general attitudes, curriculum, educational aspirations, attitudes toward school and individual academic subjects, school behaviors, and scores on relevant High School and Beyond tests as well as teachers' perceptions of the students. The full models explained 46 percent of the variance in English grades, 42 percent of the variance in algebra grades, and 44 percent of the variance in geometry grades. The full models tended to explain more of the variance in males' than in females' grades, with a more marked difference in English and Algebra 1 than in Algebra 2 or geometry. This suggests that some other variable, not included in the models, may have been affecting grades.

Even after controlling for all the variables in the full models, a significant association between gender and course grades remained in English and in Algebra 1; there was no significant relationship between gender and grades in Algebra 2 or in geometry. Teachers' comments were significantly associated with grades for both males and females in English, Algebra 1, and geometry, but they were not significantly associated with males' grades in Algebra 2. Teachers' perceptions of students were significantly associated with gender even after controlling for all the variables in the full models. These findings suggest that teachers may have gender-related expectations for the students in their courses. The High School and Beyond verbal test scores were significantly associated with grades for both females and males in English and High School and Beyond math test scores were significantly associated with grades in geometry for both males and females. High School and Beyond math test scores were not however consistently associated with grades in algebra.

Introduction

The topic of gender differences in high school grades is receiving growing attention. Parents, teachers, and students express concern and confusion over the fact that girls tend to receive higher grades than boys while boys tend to perform slightly better than girls on standardized tests. This conundrum brought to mind two lines of research that served as the starting point for this investigation: the variable quality of grades as an education outcome indicator and the hypothesized reasons for gender differences in grades.

Grades, test scores, and level of educational attainment are all used as indicators of education outcomes. Each, however, provides a somewhat different picture and, consequently, the information from these three types of indicators does not always agree. When differences appear between tests and other outcome indicators, it has become common to accept grades or other criteria as valid and to alter the predictor tests so they will have a high correlation with such criteria (Gulliksen 1976). However, it is easy to think of situations where a poor criterion might be accepted and, if so, could give the impression of poor validity. For example, if supervisor ratings are used as the criterion for an employment test, it is important to be sure these ratings are not affected by racial stereotypes before concluding that a test is ineffective in predicting the job performance of minority workers. Gulliksen has suggested using tests to evaluate criteria. He has also suggested that prediction focus on grades in specific courses rather than on overall grade-point averages. This argument does not imply that tests are never biased but, instead, points out that other education indicators also have limitations.

The variable nature of teachers' grades received considerable attention early in the twentieth century. Studies by Starch and Elliott (1912, 1913) showed that English and mathematics teachers differed considerably when grading papers in their respective subjects. In math, for example, a single geometry paper received marks ranging from 32 to 87 on a scale of 0 to 100 where 75 was defined as the passing mark. Surprisingly, math grading turned out to be even more variable than grading in the less "objective" subjects such as English and history. These studies provided the impetus for a change from numerical to letter grades, since it was obvious that teachers could not grade as precisely as the numerical system implied. These studies also helped to stimulate the growth of educational measurement, which promised "scientific" assessment less prone to bias and unreliability than grades assigned by teachers.

Although the prescriptive literature stresses that grades should be based on students' achievement (Stiggins, Frisbie, and Griswold 1989) or on explicitly stated instructional goals (Terwilliger 1989), many studies have documented that other factors are also involved.

Stiggins and his colleagues interviewed 15 high school teachers and found that although all thought

that achievement should be of primary consideration in grading, 12 thought that effort should also be considered. About half the teachers indicated they considered learning ability when assigning grades, but most felt they should not consider students' attitudes, interests, or personalities.

A 1988 survey of grading policies and practices in over 800 school districts (Robinson and Craver 1989) found that, in grades 10 to 12, most districts (60 percent) said it was their policy to grade students "against specific standards of learning for all." However, 17 percent reported grading with reference to "progress toward learning objectives for individual students" and another 17 percent reported grading "relative to overall performance of the class." While 5 percent of the districts indicated that grading was done "relative to individual pupil ability," 26 percent indicated that they had a policy of more stringent grading criteria for college-bound students. While most high schools did not include attendance in grades, 17 percent of the districts did have a policy of including attendance. The majority of school districts did not consider effort or behavior in grades. However, a third of the districts had a policy of including effort and 8 percent had a policy of including behavior in course grades.

Even when there is no policy on considering behavior and other noncognitive characteristics in grading, there is evidence that such variables may be playing a larger role in grades than administrators or teachers admit. Taylor, Brown, and Mitchell (1976) found that although cognitive measures were the best predictors of high school algebra and geometry grades, some affective measures made significant contributions. Gable, Roberts, and Owen (1977) found that both affective and cognitive variables were significantly related to social studies grades for eleventh graders. Motivation to learn predicted grades nearly as accurately as any cognitive variable.

Lewis, Dexter, and Smith investigated variations in the information used by high school English teachers to arrive at sophomores' grades. The 42 teachers were asked to indicate which of 26 factors influenced their grades. Nine different factor patterns were found. The authors concluded that high school English teachers used information in different ways in arriving at grades for their students and that these differences were reflected in the grades given. They stated, "It appears that student personal characteristics and conditions affected the grading practices of every teacher in the study" (1978, 224). However, no teacher in this study indicated that the gender of a student was taken into consideration in assigning grades.

Nevertheless, study after study has found that females receive higher grades than males (Astin 1971; Coleman 1961; Ekstrom, Goertz, and Rock 1988; Feingold 1924; Stockard and Wood 1984; and Turney 1930). The reasons for this are unclear.

An analysis of the transcripts of the 1980 high school sophomore cohort of High School and Beyond revealed that "female students got higher grades than male students in almost all instructional categories, including mathematics and physical sciences" (NCES 1984, 11). In addition to gender differences, high school grades appear to differ by subject (with more high grades in foreign languages and more low grades in mathematics), by geographic region (with more rigorous grading standards in the Middle Atlantic and South Atlantic states and less rigorous standards in the Pacific and West North Central regions), by the amount of homework done, by high school program (more high grades were given to students in the academic curriculum), and by cognitive test score level.

Literature on classroom interaction only serves to make the problem of gender differences in grades more perplexing. As Kimball has pointed out, "girls receive their better grades in classroom situations that are less than conducive to their learning. . . . Boys receive more of the teacher's attention; teachers interact with boys, particularly high-achieving boys, more than with girls; and boys are more active in providing answers, particularly unsolicited answers, than are girls" (1989, 201). Thus girls tended to receive higher grades despite receiving less teacher attention. However, as Lockheed and Klein (1985) have noted, the differential classroom treatment of male and female students by teachers is primarily in response to gender differences in precipitating student behaviors. It is not that teachers are more focused on male students than on females but that teachers respond to student behaviors that are more likely to come from males.

Gender differences in grades in different subjects may have different causes. In considering why women have higher grades in mathematics than men but lower scores on math achievement tests, Kimball (1989) hypothesized that girls' better behavior in the classroom and differential teacher expectations may lead to higher grades for young women. She suggested that the difference in girls' achievement in the classroom and on tests may also be due, in part, to preferred learning approaches. Boys may have an autonomous approach that enables them to apply math to novel situations, such as standardized test problems, while girls may prefer a rote approach to learning math. Another author (Tobias 1978) has suggested that females are more likely to be anxious about mathematics and that this may be related to their lower math achievement.

Mickelson has outlined four hypotheses that might explain women's higher grades in school, especially in

the verbal area. She based three of these hypotheses on what women may believe about the relationship between education and employment. The first hypothesis, derived from reference-group theory, is that women are aware of the sex-segregated occupational structure in our society and know that men receive greater returns from education than women, but do not care that this occurs and achieve more despite it. The second hypothesis, called the Pollyanna theory, suggests that today's young women believe sex-segregated occupational structures to be a thing of the past and, therefore, do well in school because they are confident they will have employment opportunities equal to males. Social powerlessness, the third hypothesis, assumes that women recognize the limitations facing them and use education as an avenue to a better marriage, rather than to employment. The fourth hypothesis, which makes no assumptions regarding women's beliefs about occupational opportunity, derives from the literature on sex-role socialization. It assumes that women are motivated to achieve to win social approval and other extrinsic rewards while men are motivated to achieve by the desire for mastery and intrinsic rewards. An important aspect of this sex-role socialization hypothesis for the analysis of gender differences in grades is that "girls do well because they are socialized to be good and they do better than some boys because the sex-role socialization of boys requires a degree of academic underachievement" (1989, 58).

Still another aspect of this issue is the role played by teachers' expectations. These expectations may be self-fulfilling prophecies (Brophy and Good 1974; Rosenthal and Jacobson 1968). Alternatively, "teacher expectations may lead to perceptual biases: the tendency to interpret, perceive, remember, or explain students' actions in ways consistent with their expectations" (Jussim 1989, 469). Finally, teachers' expectations may be accurately related to student achievement (Brophy 1983; Hoge 1984). Jussim (1989) has examined the extent to which each of these three views of teachers' expectations affects sixth-grade students' math grades. She found that teachers assumed that girls tried harder than boys. She also found that teachers tended to perceive girls as performing at a higher level than boys. Although Jussim concluded that teachers' expectations better predict pupil performance because they are accurate rather than because they create self-fulfilling prophecies, she found evidence for modest self-fulfilling prophecy effects on student achievement and motivation and for modest biasing effects on the grades teachers assigned to students.

Additional evidence that teachers consider gender when assigning grades comes from recent work by Manke and Loyd. In some of the hypothetical situations presented to experienced teachers, there was a significant relationship between teachers' grading practices and the gender of the student being graded. Students who got high classroom test grades but did not complete homework were more likely to receive low course grades if they were male. Students who showed substantial improvement on classroom tests during a course but were still performing at a failing level were more likely to be given a D in the course if they were female. The authors concluded that "at least in some situations the gender of the student determines what the teacher believes is the appropriate grade for the student" (1990, 24).

Thus a pivotal concern in examining the reasons for gender differences in high school grades is determining the extent to which these differences are related to characteristics of the students, either as they affect achievement directly or as they affect teacher-student interactions, and the extent to which the differences are a function of teachers' attitudes and beliefs.

Gender differences in overall grade-point average may be related to the different course-taking patterns of females and males. In examining gender differences in the prediction of college grades, Elliott and Strenta found that it was important to adjust for differences in departmental grading standards, "because math and science departments attract relatively abler students, adapt to their level of ability, and thus grade them relatively hard" (1988, 345). This suggests that studies of gender differences in grades should be conducted at the course level, rather than by looking at overall grade-point average (GPA), to eliminate any subject-by-subject differences in grading standards.

This study investigated differences in the English and mathematics grades received by female and male high school students in grade 10. It used the student questionnaire, test, and transcript data and the Teacher Comment File from the 1980 High School and Beyond sophomore cohort. The goal was to identify the major variables related to grade 10 English and mathematics grades and to seek reasons for the gender differences often found in high school grades.

Conceptual Model

The study began by developing a conceptual model based on the literature relating to student achievement in high school. This model is shown in Figure 1.

The major elements of the model are: student background characteristics (sex, race/ethnicity, socioeconomic status [SES]); general attitudes (self-concept,

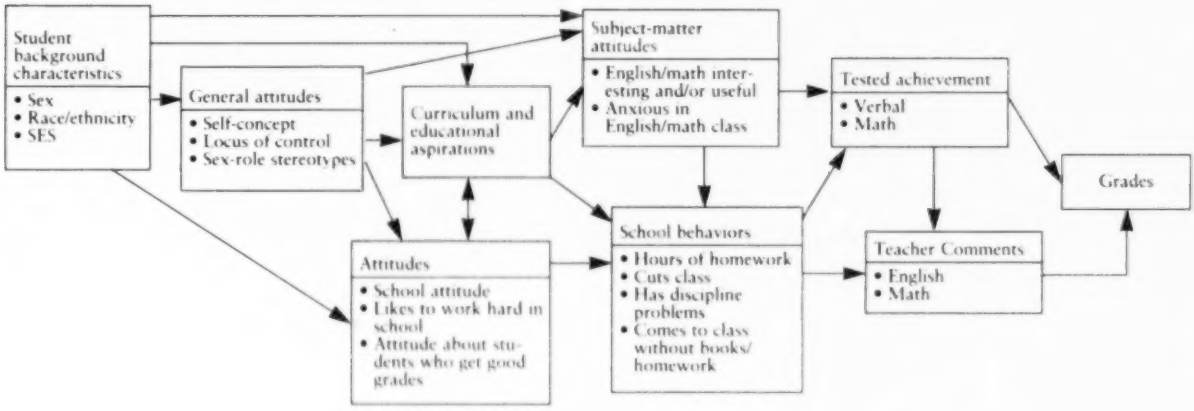

FIGURE 1. Gender and grades: Conceptual model.

locus of control, sex-role stereotypes); family press for education (mother's educational aspirations for student, parents monitor schoolwork, student plans school program with parents); peer influences (best friend's attitude toward school and attitude toward students who get good grades); curriculum and educational aspirations; school attitudes (like to work hard in school, attitude toward students who get good grades); school behaviors (hours of homework, cuts class, has discipline problems, comes to class without books/homework); subject matter attitudes (English/math interesting and/or useful, anxious in English/math class); teachers' perceptions of students (Teacher Comment File); and the outcome variables, English and math grades. Tested achievement (as represented by High School and Beyond test scores) is also shown as an outcome in this model since tests, like grades, are important education indicators.

Subjects

The subjects in this analysis were tenth graders in the 1980 High School and Beyond data set who had plans for postsecondary education and who had taken the SAT by the spring of their senior year in high school. The original plan had been to select all students who stated they had taken the SAT. However, a review of the responses to this item suggested that some students might have answered "yes" because they interpreted SAT to refer to the Stanford Achievement Test or were otherwise confused (the questionnaire used only the letters SAT instead of spelling out Scholastic Aptitude Test). Consequently, the sample was further limited to include only students who indicated that they had taken the SAT and who also, either in grade 10, grade 12, or both, indicated that they hoped to attend college at some time in the future.

The sample sizes reported in the descriptive analysis are based on adjusted weighted *N*s. The total sample in this part of the study consisted of 1,709 male students and 2,252 female students meeting the above criteria, for whom there were transcript files and teachers' comments. The regression analysis was based on unadjusted *N*s; there were 559 males and 655 females in this portion of the analysis.

Approximately 8 percent of the male students in this sample were black, 9 percent Hispanic American, and 3 percent Asian American (a total of 20 percent nonwhite). Among the female students, approximately 12 percent were black, 7 percent Hispanic American, and 2 percent Asian American (a total of 21 percent nonwhite). The male students tended to come from families of slightly higher socioeconomic status than the females (2.36 versus 2.28 on a scale on which 3 was the highest SES and 1 the lowest SES). Approximately 10 percent of the males and 17 percent of the females attended Catholic high schools, while 5 percent of both males and females attended other nonpublic high schools. Fifty-nine percent of the males and 67 percent of the females reported being enrolled in an academic curriculum.

Method

The investigation is divided into two parts: (1) a descriptive analysis giving an overview of the major vari-

ables in the study; and (2) a relational analysis that examines the amount of variance that the conceptual model explains in five outcome variables (English grades, English teachers' comments, algebra grades [separately for Algebra 1 and Algebra 2], geometry grades, and math teachers' comments), the relationship between gender and these outcome variables using the same conceptual model, the amount of variance in the outcome variables that the model explains for males and for females, and the detailed full model for each outcome.

TABLE 1

English and Math Grades (Weighted): Means and Standard Deviations

	Males		*Females*		
	Mean	SD	*Mean*	SD	*Difference*
English, grade 9	2.63	0.91	2.98	0.85	−0.35*
English, grade 10	2.64	0.94	2.91	0.85	−0.24*
Math, grade 9	2.58	1.04	2.67	1.02	−0.09
Math, grade 10	2.50	1.07	2.53	1.07	−0.03
Algebra 1	2.16	1.15	2.46	0.99	−0.30*
Algebra 2	2.84	0.97	2.97	0.96	−0.13
Geometry	2.67	1.03	2.47	1.06	0.20*

*Statistically significant difference.

Descriptive Analysis

Grades

The High School and Beyond transcript file was used to obtain grades in the English and mathematics courses taken by the students in the sample in grades 9 and 10. The grade 10 mathematics grades were separated for geometry and algebra after an inspection of correlation matrices showed somewhat different relationships between other variables and grades in these two types of mathematics courses. Later, because the results for algebra and geometry differed considerably, the algebra grades were further divided into Algebra 1 and Algebra 2 to facilitate consideration of whether the algebra and geometry differences were related to the level or to the content of the course.

The mean grades in grade 9 and grade 10 English and mathematics courses are shown in Table 1 (on a scale in which A = 4, B = 3, C = 2, and D = 1). Females had higher grades in English and somewhat higher grades in mathematics with the exception of geometry, in which males outshone females. The gender differences in English grades were statistically significant for both grade 9 and grade 10. The gender differences in overall math grades were not statistically significant for grade 9 or grade 10. However, when tenth-grade math grades were separated into algebra marks and geometry marks, there were significant gender-associated differences. This emphasizes the importance of looking at grade differences at the course level.

Test Scores

The High School and Beyond data provided several test scores that one might expect would be related to English and mathematics grades. The verbal tests that are most relevant for English grades are vocabulary, reading, and writing ability. The 1980 High School and Beyond Vocabulary Test was a multiple-choice test of moderately difficult items, consisting of one word followed by five possible synonyms; the subjects were allowed 7 minutes to complete the 21 items. The Reading Test, also multiple choice, was relatively unspeeded; 15 minutes were allowed for the subjects to read 5 passages and answer 20 questions. The Writing Test consisted of 17 multiple-choice items involving the use of capitalization, punctuation, form, and style; 10 minutes were allowed for this test. A verbal composite score was created, based on the standardized means for these three tests. The Mathematics Test was the only High School and Beyond test that appeared relevant for mathematics grades. The math test, also multiple choice, consisted of two parts with a total of 38 items. Most of the items required the test-taker to indicate: which of two quantities was greater, if the two quantities were equal, or if there was insufficient information to make a decision. The items did not require specific algebra, geometry, or trigonometry skills. The mean scores on these High School and Beyond tests, which were given to the students in the spring of their sophomore year (grade 10) are shown in Table 2.

In contrast to course grades, test score differences tended to favor males with the exception of the Writing Test, on which females outshone males. However, the gender differences on the Writing Test and on the Mathematics Test were the only two large enough to have statistical significance. The reversal of gender differences between course grades and tests probably occured because each was measuring some different as well as some common aspects of educational attainment. For example, multiple-choice tests do not evaluate the kinds of skills required to write an essay or to solve an algebra problem.

Correlations between students' scores on the High School and Beyond tests and the grades they received in

TABLE 2

High School and Beyond Achievement Test Scores (Weighted): Mean Number of Items Correct and Standard Deviations (Except for Verbal Composite, Which Is a Standardized Score)

	Males (N=1,709)		*Females (N=2,252)*		
	Mean	SD	*Mean*	SD	*Difference*
Verbal composite	55.44	8.24	55.70	7.95	-0.26
Vocabulary	11.92	4.86	11.30	5.11	0.62
Reading	9.82	4.61	9.17	4.66	0.65
Writing	10.15	4.45	11.80	3.81	-1.65*
Mathematics	19.37	9.29	17.88	8.61	1.49*

*Statistically significant difference.

English and mathematics are shown in Table 3. All are statistically significant (at or beyond the .05 level). As Table 3 shows, the relationship between test scores and grades tended to be stronger for males than for females. This suggests that females' grades may be affected by some other variable not related to the tests. One factor that may affect grades but not test scores is teachers' perceptions of students. Another possibility is that the course grade includes a much wider variety of skills than are assessed by the High School and Beyond multiple-choice tests.

Teacher Comment File

The High School and Beyond Teacher Comment File provided an opportunity to determine if teachers have different views of male and female students. The File contained seven items to which teachers responded yes, no, or don't know for each student. Since this appears to be the first study to make use of these teachers' comments, detailed information on the content of the File is provided.

The items in the Teacher Comment File asked: "Will this student probably go to college?" "Is this student working up to potential?" "Does this student seem popular with others?" "Has this student talked to you (the teacher) outside of class?" "Does this student seem to dislike school?" "Does this student have the self-discipline to hold a job?" and "May this student have a physical or emotional handicap?" The teachers' responses were linked to the High School and Beyond students in grade 10 and the comments were classified by the subject in which the teacher instructed the student. In this study we looked at comments by teachers who had the High School and Beyond sophomores in grade 10 English or mathematics classes.

The percentages of English teachers responding yes, no, or don't know to the seven items with reference to the male and female subjects in this sample are shown in Table 4; responses of the mathematics teachers are shown in Table 5. There are relatively small differences between the ratings of the English teachers and those of the mathematics teachers. Thus, the comments do not appear to be idiosyncratic by subject.

The teachers, especially in English, differed in their perceptions of male and female students. In general, they tended to be more positive about females than males, but there were item-to-item differences. For both English and math teachers, the largest gender difference in the ratings appeared on the item dealing with whether or not the student was working up to potential.

The teachers' comments were factor-analyzed to obtain a better understanding of their structure. For both English and math teachers, two factors emerged with roots greater than 1.0. These factors accounted for 53 percent of the variance in the English teachers' comments and 52 percent of the variance in the mathematics teachers' comments. In each analysis, the first factor had loadings of .7 on the "self-discipline" item, -.7 on the "seems to dislike school" item, and .6 on the

TABLE 3

Correlations Between High School and Beyond Tested Achievement and English and Math Grades of Male and Female Students

	Verbal Composite		*Math Test*	
	M	*F*	*M*	*F*
Grade 10 English	.59	.48		
Grade 10 Math			.51	.40
Algebra			.53	.47
Geometry			.47	.45

TABLE 4

English Teachers' Comments About Students (Percentages)

	Male Students			*Female Students*			*Difference in Percentage Yes*
	Y	*N*	*DK*	*Y*	*N*	*DK*	
Will probably go to college	67	14	18	68	14	18	-01
Working up to potential	53	40	7	71	25	4	-18
Seems popular	76	12	12	84	7	9	-08
Talked to me outside class	36	63	0	34	64	1	02
Seems to dislike school	12	80	8	6	87	6	06
Has self-discipline	77	10	13	84	5	11	-07
May have a handicap	7	78	15	5	81	14	02

TABLE 5

Math Teachers' Comments About Students (Percentages)

	Male Students			*Female Students*			*Difference in Percentage Yes*
	Y	*N*	*DK*	*Y*	*N*	*DK*	
Will probably go to college	70	15	14	69	11	19	01
Working up to potential	58	37	5	65	30	5	–07
Seems popular	79	9	12	83	6	11	–04
Talked to me outside class	33	66	0	35	64	1	–02
Seems to dislike school	10	84	6	7	88	5	03
Has self-discipline	80	10	10	84	5	10	–04
May have a handicap	6	81	13	5	80	15	01

"will probably go to college" and the "working up to potential" items. In each analysis, the second factor had loadings of .7 on the "talked to me outside of class" item; the second factor also had loadings of .6 or .5 on the "may have a handicap" item. The item relating to "student popularity" had modest loadings (.3 or .4) on both factors, positive on the first factor and negative on the second.

A composite teachers' comments variable was constructed, based on the first factor scores. This variable was related to course grades; it was also used in the regression analyses. All correlations between teachers' comments and grades, shown in Table 6, were statistically significant (at or beyond the .05 level). There was a stronger relationship between teachers' comments and grades for males than for females in English. The opposite held true for mathematics grades in general and for geometry grades, with females' grades more highly related to teachers' comments than males' grades. The relationship between teachers' comments and algebra grades was the same for males and females. Thus we could conclude that teachers' views of students played a larger role in the English grades of males and in the geometry grades of females. But, without a regression analysis, we could not tell if these differential relationships between teachers' comments and grades were related to differences in students' attitudes and behaviors.

TABLE 6

Correlations Between Teachers' Comments Composite and English and Math Grades of Male and Female Students

	English Teacher		*Math Teacher*	
	M	***F***	**M**	***F***
Grade 10 English	.52	.46		
Grade 10 Math			.38	.45
Algebra			.40	.40
Geometry			.35	.46

Students' Attitudes and Behaviors

One possible explanation for gender differences in grades and in teachers' comments is that females and males differ in their school-related attitudes and behaviors and these differences are reflected in grades and teachers' comments. Table 7 summarizes the mean scores of males and females on selected items from the High School and Beyond student questionnaire. These items included self-reports of general attitudes (self-concept, locus of control, and sex-role attitudes), school-related attitudes (attitude about school and attitude about students who get good grades), subject-specific attitudes (interest in English and math, belief that English and math will be useful in one's future, and anxiety in English and math classes), and school behaviors (hours of homework, number of days absent from school but not sick, frequency of coming to class unprepared—without books, paper and pencil, or homework—frequency of cutting class, and extent of discipline problems). The figures for interest in English and math, perceived usefulness of English and math, cutting class, and discipline problems represent percentages. Self-concept, locus of control, and attitude about stu-

TABLE 7

Attitudes and Behaviors as Reported on High School and Beyond Student Questionnaire: Means and Standard Deviations

	Males (N=1,709)		*Females (N=2,252)*		*Difference*
General attitudes					
Self-concept	2.04	0.74	1.85	0.74	0.19*
Locus of control	1.99	0.75	2.07	0.74	–0.08
Sex-role attitudes	2.43	0.61	2.86	0.72	–0.43*
School attitudes					
School attitude	2.43	0.70	2.59	0.64	–0.16*
Attitude about good grades	2.42	0.57	2.55	0.51	–0.13*
Subject attitudes					
English interesting	0.31	0.46	0.45	0.50	–0.14*
English useful in future	0.61	0.49	0.60	0.49	0.01
English class anxiety	1.74	0.86	1.57	0.77	0.17*
Math interesting	0.42	0.49	0.40	0.49	0.02
Math useful in future	0.69	0.46	0.63	0.48	0.06
Math class anxiety	1.69	0.84	1.87	0.89	–0.18*
Behaviors					
Hours of homework	4.62	3.43	6.15	3.66	–1.53*
Days absent, not sick	1.99	3.35	1.53	2.34	0.46
Came to class unprepared	1.78	0.48	1.64	0.45	0.14*
Cut class	0.18	0.38	0.17	0.37	0.01
Discipline problems	0.14	0.35	0.08	0.27	0.06*

*Statistically significant difference.

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TABLE 8

Correlations of Background Characteristics, Attitudes, and Behaviors with English, Algebra, and Geometry Grades of Male and Female Students

	English		*Algebra*		*Geometry*	
	M (N=1,672)	F (N=2,203)	M (N=382)	F (N=408)	M (N=502)	F (N=713)
Background						
SES	.17*	.14*	.12*	.11*	.12*	.08*
Minority (black)	−.22*	−.20*	−.16*	−.09*	−.17*	−.17*
Minority (Hispanic)	−.17*	−.09*	−.04	−.11*	−.08*	−.08*
General attitudes						
Self-concept	.09*	.07*	.10*	.09*	.09*	.06*
Locus of control	.21*	.21*	.10*	.21*	.17*	.13*
Sex-role attitudes	−.15*	.03	.00	.01	.02	.02
Curriculum and educational aspirations						
Academic (vs. general)	.15*	.19*	.21*	.13*	.06*	.06*
Educational aspirations	.32*	.24*	.32*	.09*	.27*	.21*
School attitudes						
School attitude	.22*	.21*	.24*	.18*	.24*	.13*
Attitude about good grades	.19*	.15*	.14*	.02	.17*	.09*
Subject attitudes						
Useful	.01	.04	.14*	−.05	.14*	.02
Interesting	.09*	.14*	.20*	.18*	.26*	.16*
Anxiety	−.28*	−.26*	−.39*	−.33*	−.39*	−.37*
School behaviors						
Hours of homework	.19*	.18*	.23*	.09*	.10*	.08*
Came to class unprepared	−.21*	−.17*	−.20*	−.16*	−.23*	−.12*
Cut class	−.13*	−.11*	.01	−.04	−.14*	−.04
Days absent, not sick	−.14*	−.16*	−.14*	−.11*	−.09*	−.02
Discipline problems	−.18*	−.22*	.00	−.13*	−.18*	−.15*

*Statistically significant difference.

dents who get good grades are rated on a three-point scale with a higher number indicating a more positive attitude. Sex-role attitudes are rated on a four-point scale with a higher score indicating a less stereotyped attitude. Coming to class unprepared is rated on a three-point scale with a higher score indicating greater unpreparedness. Hours of homework and days absent but not sick are actual numerical counts. The subject anxiety scores are composites based on three items—feeling at ease in class, not being scared in class, and dreading class—with a lower score indicating less anxiety.

The male students in this sample were significantly more self-confident than the females; they had significantly more anxiety about English class, were significantly more likely to come to class unprepared, and had significantly more discipline problems than the female students. The females held significantly fewer sex-stereotyped attitudes and had a significantly more positive attitude toward school and toward students who get good grades; they were significantly more likely to find English class interesting and significantly more anxious in math class; they also spent significantly more time on homework. The regression analysis may help determine the extent to which these differences in attitudes and behaviors are related to the gender differences in teachers' comments and in grades.

Correlations of the background, attitude, and behavior variables with the English, algebra, and geometry grades of male and female tenth graders are shown in Table 8.

Naturally, in samples of this size, most of the correlations are statistically significant. In English, the strongest relationships showed that grades were higher for males and females with high educational aspirations, positive school attitudes, and internalized locus of control; English grades were lower for students of both sexes who were anxious in class and for black females and males. For males, not coming to class without homework done was also important, while for females not having discipline problems was important. In al-

TABLE 9

Correlations Between Student Background Characteristics, Attitudes, Behaviors, Tested Achievement, and Teachers' Comments Composites

	English Teachers		*Math Teachers*	
	Males (N=1,054)	*Females (N=1,389)*	*Males (N=1,022)*	*Females (N=1,326)*
Background				
SES	.11*	.07*	.02	.08*
Minority (black)	−.03	−.08*	−.06*	−.08*
Minority (Hispanic)	−.08*	−.14*	−.04	−.00
General attitudes				
Self-concept	−.02	−.03	−.03	.07*
Locus of control	.15*	.20*	.09*	.16*
Sex-role attitudes	.05	−.07*	−.04	.06*
Curriculum and educational aspirations				
Academic (vs. general)	.17*	.16*	.14*	.08*
Educational aspirations	.26*	.22*	.21*	.18*
School attitudes				
School attitude	.28*	.20*	.14*	.08*
Attitude about good grades	.13*	.15*	.17*	.13*
School attitudes				
Useful	.09*	−.02	.09*	.02
Interesting	.02	.06*	.06*	.04
Anxiety	−.28*	−.20*	−.13*	−.23*
School behaviors				
Hours of homework	.17*	.16*	.12*	.20*
Came to class unprepared	−.20*	−.20*	−.15*	−.14*
Cut class	−.21*	−.18*	−.22*	−.05*
Days absent, not sick	−.21*	−.09*	−.02	−.10*
Discipline problems	−.33*	−.32*	−.15*	−.23*
Tested achievement				
Verbal	.32*	.22*		
Math			.27*	.27*

*Statistically significant difference.

gebra, only anxiety in math class showed a strong relationship with grades for both females and males. For males the other important correlations were school attitudes, the amount of time spent on homework, being in the academic curriculum, finding math interesting, and not coming to class unprepared. For females, locus of control also showed a high correlation with algebra grades. In geometry, anxiety in class and educational aspirations were important for both females and males. For males, school attitudes and not coming to class unprepared also had high correlations with geometry grades.

For a more complete understanding of the factors that were associated with grades and how these differed for males and females, it is necessary to go to the relational analysis. Before doing this, however, the relationships between the student background, attitude, behavior, and test score explanatory variables and teachers' comments deserve attention.

These correlations are shown in Table 9. In English, the relationships between the explanatory variables and English teachers' comments tended to be weaker for females than for males. Males' tested verbal ability played a much larger role in teacher perceptions than did females' tested verbal ability. For both males and females, in addition to ability, not having discipline problems, not being anxious in class, having a positive attitude toward school, and having high educational aspirations all showed strong relationships with English teachers' comments.

In math, the relationship between tested achievement and teachers' comments was the same for females and males. However, the relationships between the other explanatory variables and math teachers' com-

ments showed more differentiation by gender than did the English teachers' comments. For males, not cutting class and having high educational aspirations were most important; for females, not having discipline problems, not being anxious in class, and spending more time on homework were most important. The relationships between students' sex-role attitudes and teachers' comments suggest that teachers viewed their subjects as gendered territory. For females, having nonstereotyped attitudes was associated with negative English teachers' perceptions, while for males, nonstereotyped attitudes were associated with negative evaluations by math teachers.

Relational Analysis

The relational analysis consisted of a series of regression analyses. Variables were added to the regression a block at a time so that the degree of the relationship between each block of explanatory variables and grades could be examined. Each set of regressions was done twice, once without the High School and Beyond test scores and once with the test scores included as a proxy for student ability. Ideally this study would have included some measure of developed abilities to serve as a proxy for the ability that teachers would have been observing and reacting to in the classroom. Lacking this, we used the High School and Beyond tests, as discussed above.

The analytical model is shown in Figure 2. It is similar to the conceptual model but all paths are direct. This is not to say that the explanatory variables had no indirect effects, such as through teachers' comments. Limiting the analysis to direct effects was done to simplify a complex task.

The relational analysis had four major goals: (1) to determine how much of the variance in high school grades for the total group (males and females) was explained by the full analytical model and how much as each block was removed from the full model; (2) to determine the relationship between gender and grades for the full model and as each block was removed from the model; (3) to determine if the model explained grades equally well for females and males; and (4) to determine the relationship between grades and each variable in the full model for both females and males.

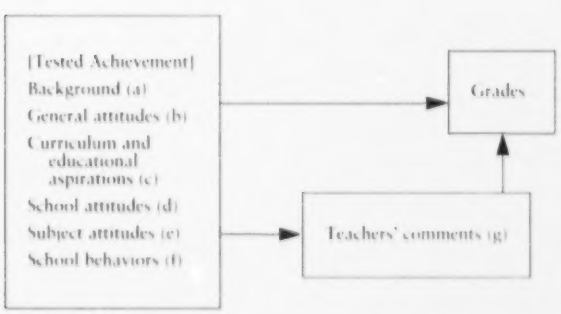

FIGURE 2. **Analytical model of factors affecting high school grades.**

A secondary goal of the analysis was to explore: how much of the variance in the teachers' comments composite for the total group could be explained by the model, the relationship between gender and teachers' comments, the extent to which the model explained teachers' comments for males and females, and the relationship between teachers' comments and each variable in the full model. The teachers' comments composite used in this analysis was based on the items loading on the first of the two factors of the analysis of the Teacher Comment File; these items were the teachers' perceptions of student self-discipline, dislike of school, probability of attending college, and working up to potential.

The original plan for the relational analysis included a factor analysis of the explanatory variables, to see how well the conceptual model was replicated, and then the use of the factors in the regression analysis. However, when more than three factors were extracted, there were different factor structures for males and females, although it was clear from the roots that more than three factors were present. For example, in the eight-factor solution, males had a bipolar factor on which school attitudes and negative behaviors, such as discipline problems, loaded and a separate factor on which educational aspirations and hours of homework loaded. For females, positive educational aspirations loaded on the same factor with school attitudes, while discipline problems appeared on a separate factor. Using the three-factor solution, composite variables were created with the variables that loaded more than .30. These variables were: (1) attitude toward students getting good grades; (2) other positive attitudes and behaviors; and (3) negative attitudes and behaviors. This third factor was reflected to nonnegative attitudes and behaviors for ease of interpretation in the regression analysis. The reliabilities of these composites were determined. One composite, nonnegative attitudes and behaviors, was more reliable for males than for females. A regression analysis using these composites is presented in the Appendix. Although this alternative analysis avoids the problem of multicollinearity among the student attitude and behavior variables, it is difficult to decide which element(s) of the composites contributes to the relationship between these variables, teachers' comments, and grades. Moreover, this analysis may conceal

TABLE 10

Multiple Correlations (Squared) of English Teachers' Comments Composite Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Verbal Composite*			*With Verbal Composite*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.01	.02	.04	.14	.05	.11
Restricted 2	a,b	.03	.07	.07	.15	.09	.12
Restricted 3	a,b,c	.10	.11	.12	.19	.13	.17
Restricted 4	a,b,d	.11	.10	.13	.20	.15	.19
Restricted 5	a,b,c,d	.14	.13	.15	.20	.15	.19
Restricted 6	a,b,c,d,e	.18	.15	.18	.23	.16	.20
Restricted 7	a,b,c,d,f	.22	.20	.23	.27	.21	.25
Full	All (a–f)	.26	.22	.25	.30	.22	.27

gender differences in the effects of attitudes and behaviors on grades.

It is important to remember that the proportion of the variance attributable to different sets of independent variables is sample-specific. R^2 is affected by the variability of the sample on: (1) the variables included in the model; (2) the variables not included in the model; and (3) the errors in measurement of the dependent variables.

English Teachers' Comments

Because of the important role that teachers' perceptions of students appeared to play in grades, this study first explored the amount of variance in these comments explained by each of the models and the relationship between gender and teachers' comments, and then obtained full regression models for teachers' comments.

Table 10 shows the amount of variance in English teachers' comments explained by the blocks of variables in the restricted and full models: a) background, b) general attitudes, c) curriculum and educational aspirations, d) school attitudes, e) attitudes about English, and f) school behaviors. It also shows the changes in R^2 as each of these blocks was added to the model. As with English grades, one set of regressions does not include the verbal test score composite while the other includes this variable. The two full models for the total group (males and females) explained 25-27 percent of the variance in English teachers' comments, depending on whether or not the verbal test composite was included.

Table 11 shows the relationship between gender and English teachers' comments for all models both with and without the verbal test score composite. This relationship was statistically significant in all models, both with and without the composite. Thus, other gender-related variables, not included in our model, appeared to be affecting English teachers' comments and producing negative opinions about males.

Going back to Table 10, in the full model and in most of the restricted models, the models explained more of the variance in English teachers' comments about males than about females. The exceptions were Restricted Models 1, 2, and 3 without the verbal composite; in these cases, less of the variance was explained for females. Thus background, general attitudes, and curriculum and educational aspirations appeared to give females an edge over males in the opinions of their English teachers when verbal ability was not taken into consideration.

The full regression models for the English teachers' comments composite for females and males, both with and without the verbal test composite, helped us see how the variables associated with English teachers' comments differed by gender. These regressions are shown in Table 12. Students' school attitudes, anxiety about English class, and discipline problems were significantly associated with English teachers' comments in both regressions (with and without the verbal test composite) and for both males and females. Of these, discipline problems appeared to be the most important. The effect of the verbal test composite on English teachers' comments was much larger for males than for females. In both regressions, being absent but not sick was negatively associated with teachers' comments for males. For females in both regressions, an internalized locus of control was associated with more positive comments, while having nonstereotyped sex-role attitudes, believing that English will be useful in the future, and cutting class were significantly associated with negative teachers' comments. The gender differences in the variables significantly associated with English teachers' comments suggest that these teachers expected different

TABLE 11

Standardized and Raw Regressions of Gender on English Teachers' Comments Composite for Each Model

Model	Blocks Included	Without Verbal Composite		With Verbal Composite	
		Standardized	Raw	Standardized	Raw
Restricted 1	a	−.17*	−.08	−.15*	−.07
Restricted 2	a,b	−.16*	−.08	−.17*	−.08
Restricted 3	a,b,c	−.15*	−.07	−.16*	−.07
Restricted 4	a,b,d	−.11*	−.05	−.12*	−.05
Restricted 5	a,b,c,d	−.11*	−.05	−.12*	−.05
Restricted 6	a,b,c,d,e	−.10*	−.05	−.11*	−.05
Restricted 7	a,b,c,d,f	−.09*	−.04	−.10*	−.05
Full	All (a–f)	−.08*	−.04	−.09*	−.04

*Significant *T*-statistic.

kinds of behaviors from female and male students. This hypothesis is reinforced by the negative correlation between females' sex-role attitudes and English teachers' comments.

Since significant and negative associations between gender and English teachers' comments were found for the total group, it seems likely that the teachers were considering some other gender-associated variables, not included in the full model, when they commented on their students. For all the models that included the High School and Beyond verbal test score composite as well as four of the seven models that did not include it, more of the variance in teachers' comments was explained for males than for females.

English Grades

Table 13 summarizes the regression analyses for English grades. As indicated earlier, there was a statistically significant gender difference in these grades, with males averaging 2.64 and females 2.91. R^2s are shown for the full model for the total group and separately for males and females. Table 13 also shows changes in R^2 when various blocks were added to the model. The blocks of variables labeled a) to f) have already been identi-

TABLE 12

Full Model for English Teachers' Comments Composite for Males and Females: Standardized and Raw Regression Weights

	Without Verbal Composite				With Verbal Composite			
	Males		Females		Males		Females	
	Standardized	Raw	Standardized	Raw	Standardized	Raw	Standardized	Raw
Background								
SES	−.02	−.01	−.02	−.01	−.03	−.01	−.04	−.01
Minority	−.08	−.06	−.10*	−.05	−.00	−.00	−.06	−.03
General attitudes								
Self-concept	−.07	−.02	−.02	−.01	−.08*	−.03	−.02	−.00
Locus of control	.02	.01	.11*	.03	−.02	−.01	.09*	.02
Sex-role attitudes	−.02	−.01	−.08*	−.02	−.03	−.01	−.10*	−.03
Curriculum and educational aspirations								
Academic (vs. general)	.05	.02	.03	.01	.02	.01	.01	.01
Educational aspirations	.11*	.02	.12*	.02	.05	.01	.12*	.02
School attitudes								
School attitude	.10*	.04	.09*	.03	.10*	.04	.10*	.03
Attitude about good grades	.04	.02	.04	.02	.03	.01	.04	.02
English attitudes								
Useful	.00	.00	−.09*	−.04	−.01	−.00	−.10*	−.04
Interesting	−.03	−.02	.02	.01	−.03	−.02	.02	.01
Anxiety	−.21*	−.06	−.09*	−.02	−.17*	−.05	−.08*	−.02
School behaviors								
Hours of homework	.01	.00	.05	.00	.02	.00	.05	.00
Came to class unprepared	−.08	−.04	.02	.01	−.07	−.04	.02	.01
Cut class	−.05	−.03	−.10*	−.05	−.07	−.04	−.11*	−.06
Days absent, not sick	−.13*	−.01	−.05	−.00	−.11*	−.01	−.05	−.00
Discipline problems	−.20*	−.14	−.22*	−.16	−.18*	−.13	−.21*	−.15
Verbal test composite	—	—	—	—	.23*	.01	.12*	.00

*Significant *T*-statistic.

TABLE 13

Multiple Correlations (Squared) of English Grades Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Verbal Composite*			*With Verbal Composite*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.08	.08	.10	.34	.24	.30
Restricted 2	a,b	.13	.10	.13	.35	.25	.31
Restricted 3	a,b,c	.23	.14	.19	.38	.27	.33
Restricted 4	a,b,d	.19	.15	.18	.38	.31	.35
Restricted 5	a,b,c,d	.25	.18	.22	.39	.32	.36
Restricted 6	a,b,c,d,e	.30	.21	.26	.42	.34	.38
Restricted 7	a,b,c,d,f	.29	.20	.25	.42	.33	.37
Restricted 8	a,b,c,d,e,f	.33	.23	.28	.44	.35	.40
Full	All (a–g)	.43	.32	.37	.50	.42	.46

fied; g) represents the English teachers' comments composite.

The full model explained 37 percent of the variance in English grades for the total group (males and females) in this sample when the verbal test composite was not included and 46 percent of the variance when the verbal composite was included.

Table 14 shows the standardized and raw regressions of gender (male) on English grades for the restricted models as each block of variables was added and for the full model.

Except for the full model that excluded the verbal test score composite, there was a statistically significant negative relationship between gender and English grades. This indicates that, even after accounting for all the explanatory variables in these models, English grades remained significantly lower for males than for females, with the exception of the model in which English teachers' comments were included but in which there was no control for students' verbal test scores. The size of the relationship between gender and English grades grew smaller as more and more blocks were added to reach the full model.

Returning to Table 13, we found that each model explained more of the variance in males' English grades than in those of females. The exception was Restricted Model 1 (background only) excluding the verbal composite, which explained grades equally well for females and males. Without the verbal composite, the full model explained 43 percent of the variance in males' English grades but only 32 percent in females' grades. When the verbal composite was included in the full model, 50 percent of the variance in males' grades was explained but only 42 percent of the variance in females' grades.

Some of the reasons for these gender differences can be understood by examining the full regression models for English grades, both with and without the verbal test composite, shown in Table 15.

Only two variables were significantly associated with English grades in both models and for both females and males: English teachers' comments and students' anxiety about English class. It is important to stress that no causality is implied here. Teachers may make positive comments about students to whom they also give good grades or they may give better grades to students who impress them in a positive manner. Students may be anxious in English class because they get poor grades or they may get poor grades because their anxiety in English class interferes with their learning. However, the fact that anxiety about English class remained significant even after controlling for tested verbal skills indicates that anxiety is not entirely due to poor verbal ability.

There were several interesting gender differences in the variables significantly associated with English grades. For males, the other variables associated with high grades in English, both with and without the

TABLE 14

Standardized and Raw Regressions of Gender on English Grades for Each Model

Model	*Blocks Included*	*Without Verbal Composite*		*With Verbal Composite*	
		Standardized	*Raw*	*Standardized*	*Raw*
Restricted 1	a	−.15*	−.27	−.12*	−.23
Restricted 2	a,b	−.15*	−.27	−.15*	−.27
Restricted 3	a,b,c	−.14*	−.24	−.15*	−.26
Restricted 4	a,b,d	−.10*	−.18	−.11*	−.20
Restricted 5	a,b,c,d	−.10*	−.18	−.12*	−.21
Restricted 6	a,b,c,d,e	−.09*	−.15	−.10*	−.18
Restricted 7	a,b,c,d,f	−.09*	−.15	−.10*	−.18
Restricted 8	a,b,c,d,e,f	−.07	−.12	−.09*	−.16
Full	All (a–g)	−.04*	−.07	−.06*	−.11

*Significant *T*-statistic.

TABLE 15

Full Model for English Grades for Males and Females: Standardized and Raw Regression Weights

	Without Verbal Composite				*With Verbal Composite*			
	Males		*Females*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background								
SES	.00	−.01	.11*	.14	−.03	−.04	.05	.06
Minority	−.22*	−.56	−.13*	−.30	−.11*	−.27	.01	.01
General attitudes								
Self-concept	.06	.07	−.04	−.04	.04	.05	−.03	−.03
Locus of control	.08*	.10	.00	.00	.01	.02	−.06	−.07
Sex-role attitudes	.01	.02	−.01	−.01	−.01	−.01	−.07*	−.08
Curriculum and educational aspirations								
Academic (vs. general)	.01	.02	.04	.07	−.03	−.06	−.02	−.04
Educational aspirations	.18*	.13	.08*	.05	.11*	.08	.06	.04
School attitudes								
School attitude	.05	.07	.12*	.16	.05	.07	.15*	.21
Attitude about good grades	−.00	−.00	.02	.04	−.01	.01	.01	.02
English attitudes								
Useful	−.07*	−.14	−.02	−.03	−.08*	−.15	−.04	−.07
Interesting	.02	.04	.02	.03	.01	.01	.00	.00
Anxiety	−.14*	−.16	−.13*	−.14	−.10*	−.11	−.10*	−.11
School behaviors								
Hours of homework	.02	.01	−.00	−.00	.03	.01	−.01	−.00
Came to class unprepared	−.09*	−.17	−.05	−.09	−.08*	−.16	−.05	−.10
Cut class	.05	.13	.04	.09	.02	.05	.00	.01
Days absent, not sick	−.04	−.01	−.02	−.01	−.02	−.01	.00	.00
Discipline problems	−.04	−.01	−.03	−.10	−.02	−.05	.01	.03
English teachers' comments composite	.36*	1.32	.34*	1.42	.29*	1.07	.30*	1.26
Verbal test composite	—	—	—	—	.36*	.04	.41*	.04

*Significant *F* statistic.

verbal test composite in the model, were not being black or Hispanic, having high educational aspirations, not coming to class unprepared, and not believing that English will be useful in one's future. In the model excluding the test score composite, locus of control was also significantly associated with males' English grades. For females, the only variable, in addition to teachers' comments and anxiety, significantly associated in both models with high grades in English was school attitudes. Not being black or Hispanic and having high educational aspirations were significant in the model without the verbal composite. In the model including the verbal composite, females with nonstereotyped sex-role attitudes received significantly lower English grades.

There is some question as to whether or not the regression relationships between sex-role attitudes and English grades and between perceived usefulness of English and English grades are "real," since they are opposite in direction to the relationships in the correlation matrix. They may be statistical artifacts created by other variables in the regression. A negative association between English grades and perceived usefulness of the subject does not seem meaningful. However, a negative association between sex-role attitudes and English grades would be meaningful if high school English teachers expect gender-stereotyped behavior from females. We have already seen, in the correlations between English teachers' comments and the explanatory variables, that females with nonstereotyped sex-role attitudes were perceived more negatively by English teachers.

To summarize, the full models explained 37-46 percent of the variance in English grades for the total group of subjects. However, with the exception of the full model without the verbal test composite, all the restricted models and the model with the verbal composite showed a significant, negative relationship between gender and English grades. This suggests that there was a variable, not included in our model, that

TABLE 16

Multiple Correlations (Squared) of Math Teachers' Comments Composite Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Math Test*			*With Math Test*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.00	.01	.01	.08	.08	.08
Restricted 2	a,b	.01	.03	.03	.09	.09	.09
Restricted 3	a,b,c	.06	.05	.05	.11	.09	.10
Restricted 4	a,b,d	.07	.05	.06	.13	.10	.11
Restricted 5	a,b,c,d	.09	.06	.07	.14	.10	.11
Restricted 6	a,b,c,d,e	.10	.11	.09	.14	.14	.13
Restricted 7	a,b,c,d,f	.13	.12	.10	.17	.16	.14
Full	All (a–f)	.13	.17	.13	.17	.20	.16

was negatively affecting the English grades of males. One possibility is writing ability. The High School and Beyond Writing Test, included in the verbal composite, involved multiple-choice questions about grammar and punctuation and did not include composition. When the ability of the models to explain English grades for females and for males was compared, we found that the full models explained 43-50 percent of the variance in males' English grades but only 32-42 percent of the variance in females' grades. Some of the reasons for this became evident when the relationships between the specific variables and English grades were examined. Positive teachers' comments and not being anxious in English class were associated with higher grades for both females and males. For females, the only other consistently significant variable was school attitudes; for males, the other consistently significant variables were not being black or Hispanic, having high educational aspirations, and not coming to class unprepared.

Mathematics Teachers' Comments

The structure of the High School and Beyond Teacher Comment File made it impossible to separate out the comments of algebra teachers from those of geometry teachers. All we know is that the teachers taught some form of tenth-grade math to the students in this sample.

The squared multiple correlations of the math teachers' comments composite on the blocks of predictors are shown in Table 16. The blocks represent: a) background, b) general attitudes, c) curriculum and educational aspirations, d) school attitudes, e) attitudes about math, and f) school behaviors. In the full models for the total group of students, 13-16 percent of the variance was explained. This is considerably less than the variance explained by the English teachers' comments (25-27 percent).

The association between gender and math teachers' comments is shown in Table 17. Gender was significantly and negatively associated with math teachers' comments in all the models that included the High School and Beyond math test and in five of the seven restricted models without the test. However, the full model without the test did not show a significant association with gender. There was much less change in the association between gender and the comments of math teachers as blocks of variables were added to the model than with English teachers' comments.

Returning to Table 16, we can compare the amount of variance explained by math teachers' comments about male and female students. In the full models we found more variance explained in comments about females than in comments about males (17-20 percent for females, 13-17 percent for males). The restricted models without the test score showed a mixed pattern, with three models explaining slightly more variance for

TABLE 17

Standardized and Raw Regressions of Gender on Math Teachers' Comments Composite for Each Model

Model	*Blocks Included*	*Without Math Test*		*With Math Test*	
		Standardized	*Raw*	*Standardized*	*Raw*
Restricted 1	a	−.09*	−.04	−.12*	−.06
Restricted 2	a,b	−.09*	−.04	−.12*	−.06
Restricted 3	a,b,c	−.10*	−.05	−.13*	−.06
Restricted 4	a,b,d	−.06	−.03	−.10*	−.05
Restricted 5	a,b,c,d	−.08*	−.03	−.11*	−.05
Restricted 6	a,b,c,d,e	−.09*	−.04	−.11*	−.05
Restricted 7	a,b,c,d,f	−.05	−.02	−.08*	−.04
Full	All (a–f)	−.06	−.03	−.09*	−.04

*Significant *T*-statistic.

TABLE 18

Full Model for Math Teachers' Comments Composite for Males and Females: Standardized and Raw Regression Weights

	Without Math Test				*With Math Test*			
	Males		*Females*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background								
SES	−.07	−.03	.02	.01	−.11*	−.04	−.00	−.00
Minority	−.01	−.01	−.02	−.02	.04	.03	.03	.02
General attitudes								
Self-concept	−.06	−.02	−.01	−.00	−.05	−.02	−.01	−.00
Locus of control	.01	.01	.07	.02	.00	.00	.04	.01
Sex-role attitudes	−.07	−.03	.06	.01	−.08*	−.03	.04	.01
Curriculum and educational aspirations								
Academic (vs. general)	.02	.01	.01	.00	−.01	−.00	−.03	−.01
Educational aspirations	.15*	.03	.07	.01	.10*	.02	.04	.01
School attitudes								
School attitude	.07	.02	−.02	−.01	.06	.02	−.01	−.00
Attitude about good grades	.10*	.04	.04	.02	.10*	.04	.03	.01
Math attitudes								
Useful	.03	.02	−.08*	−.03	.02	.01	−.08*	−.04
Interesting	.01	.00	−.04	−.02	.01	.00	−.06	−.03
Anxiety	−.06	−.02	−.22*	−.05	.00	.00	−.20*	−.05
School behaviors								
Hours of homework	.06	.00	.15*	.01	.05	.00	.16*	.01
Came to class unprepared	.02	.01	−.07	−.03	−.02	−.01	−.09*	−.04
Cut class	−.18*	−.12	.00	.00	−.15*	−.10	.02	.01
Days absent, not sick	.06	.00	−.07	−.01	.10*	.01	−.06	−.00
Discipline problems	−.09*	−.06	−.15*	−.12	−.09*	−.06	−.14*	−.11
Math test	—	—			.25*	.01	.20*	.01

*Significant *T*-statistic.

females while the other four explained slightly more variance for males. In the restricted models with the test score, the first two models explained equal amounts of variance for both genders while the remaining five models explained more variance for males.

Table 18 shows the full model regressions for the math teachers' comments composite for males and females. Having discipline problems was consistently and negatively associated with negative comments by math teachers in both models and for both females and males. No other variable was significantly associated with teachers' comments for both females and males in both models. For males, cutting classes was significant and negative in both models, while males with high educational aspirations and positive attitudes about students who get good grades received significantly more positive math teachers' comments. While there were significant negative associations in the model including the math test between math teachers' comments about males, males' socioeconomic status, and being absent when not sick, these may be statistical artifacts since the correlations are in the opposite direction. The significant negative association between holding nonstereotyped sex-role attitudes and math teachers' comments about males in the model with the test score again suggests that some teachers may believe that math is a "male" subject and react negatively to males who do not share this view. For females, hours of homework was positively associated with math teachers' comments, while anxiety about math class and believing that math will be useful in the future were significantly associated with negative comments. Thus we found that math teachers made positive comments about students who did not have discipline problems. These teachers also made positive comments about males who did not cut class, who had high educational aspirations, and who respected students who get good grades. Math teachers made negative comments about males who held nonstereotyped sex-role attitudes, and positive comments about females who were not anxious in math class and who spent more time on homework. These teachers made negative comments about females who found math interesting. Thus math teachers' attitudes varied considerably by gender.

TABLE 19A

Multiple Correlations (Squared) of Algebra 1 Grades Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Math Test*			*With Math Test*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.06	.03	.06	.29	.13	.22
Restricted 2	a,b	.09	.19	.10	.38	.24	.24
Restricted 3	a,b,c	.11	.22	.11	.41	.26	.25
Restricted 4	a,b,d	.17	.20	.12	.53	.26	.26
Restricted 5	a,b,c,d	.19	.23	.12	.56	.28	.26
Restricted 6	a,b,c,d,e	.29	.25	.18	.58	.30	.30
Restricted 7	a,b,c,d,f	.29	.32	.17	.60	.35	.31
Restricted 8	a,b,c,d,e,f	.36	.34	.22	.63	.37	.35
Full	All (a–g)	.49	.38	.33	.70	.40	.42

Ns = 80 males, 97 females, 177 total.

Algebra Grades

Algebra 1 and Algebra 2 grades are considered separately in this report since their influence differed considerably. In algebra, as in English, females received higher grades than males. The mean Algebra 1 grades were 2.16 for males and 2.46 for females; the mean Algebra 2 grades were 2.84 for males and 2.97 for females.

Tables 19A and 19B show the amount of variance in Algebra 1 and Algebra 2 grades, respectively, explained by each of the models, both with and without the addition of the High School and Beyond mathematics test score. The blocks represent: a) background, b) general attitudes, c) curriculum and educational aspirations, d) school attitudes, e) attitudes about math, f) school behaviors, and g) math teachers' comments composite. The full model for the total group explained 33 percent of the variance in Algebra 1 grades when the test score was not included and 42 percent of the variance with the inclusion of the math test. The full model explained 38 percent of the variance in Algebra 2 grades when the math test was not included and 42 percent of the variance with the addition of the test.

The relationship between gender and algebra grades is shown in Tables 20A and 20B. All the Algebra 1 models showed a significant negative relationship with gender (lower grades for males) when the math test score was included. In the Algebra 1 models that did not include the test, four models showed significant negative relationships between gender and grades. It should be noted, however, that the size of the relationship between gender and Algebra 1 grades changed very little as blocks of variables were added to any of the models. For Algebra 2, none of the models, except Restricted Model 1 with the test score, showed a significant relationship between gender and grades.

TABLE 19B

Multiple Correlations (Squared) of Algebra 2 Grades Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Math Test*			*With Math Test*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.05	.02	.04	.21	.22	.21
Restricted 2	a,b	.13	.10	.10	.26	.25	.24
Restricted 3	a,b,c	.28	.14	.13	.32	.31	.24
Restricted 4	a,b,d	.29	.11	.12	.41	.27	.25
Restricted 5	a,b,c,d	.36	.14	.15	.42	.32	.26
Restricted 6	a,b,c,d,e	.50	.22	.26	.52	.36	.33
Restricted 7	a,b,c,d,f	.38	.18	.18	.44	.39	.29
Restricted 8	a,b,c,d,e,f	.53	.26	.28	.54	.42	.36
Full	All (a–g)	.54	.46	.38	.55	.54	.42

Ns = 96 males, 91 females, 187 total.

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TABLE 20A

Standardized and Raw Regressions of Gender on Algebra 1 Grades for Each Model

Model	*Blocks Included*	*Without Math Test*		*With Math Test*	
		Standardized	*Raw*	*Standardized*	*Raw*
Restricted 1	a	−.16*	−.34	−.28*	−.60
Restricted 2	a,b	−.15*	−.32	−.28*	−.60
Restricted 3	a,b,c	−.14	−.31	−.28*	−.61
Restricted 4	a,b,d	−.13	−.28	−.27*	−.54
Restricted 5	a,b,c,d	−.13	−.27	−.27*	−.58
Restricted 6	a,b,c,d,e	−.12	−.26	−.26*	−.57
Restricted 7	a,b,c,d,f	−.16*	−.34	−.31*	−.67
Restricted 8	a,b,c,d,e,f	−.15	−.31	−.31*	−.66
Full	All (a–g)	−.18*	−.38	−.30*	−.65

*Significant *F* statistic.

TABLE 20B

Standardized and Raw Regressions of Gender on Algebra 2 Grades for Each Model

Model	*Blocks Included*	*Without Math Test*		*With Math Test*	
		Standardized	*Raw*	*Standardized*	*Raw*
Restricted 1	a	−.09	−.17	−.13*	−.25
Restricted 2	a,b	−.07	−.14	−.11	−.21
Restricted 3	a,b,c	−.06	−.11	−.10	−.19
Restricted 4	a,b,d	−.05	−.09	−.09	−.18
Restricted 5	a,b,c,d	−.03	−.06	−.07	−.14
Restricted 6	a,b,c,d,e	−.10	−.19	−.11	−.21
Restricted 7	a,b,c,d,f	−.01	−.02	−.06	−.11
Restricted 8	a,b,c,d,e,f	−.06	−.12	−.08	−.15
Full	All (a–g)	−.03	−.06	−.05	−.09

*Significant *F* statistic.

Returning to Tables 19A and 19B, the amount of variance explained for females and males can be compared. The full model without the math test explained 49 percent of the variance in the Algebra 1 grades of males and 38 percent in those of females. The full model including the math test explained 70 percent of the variance in Algebra 1 grades for males and 40 percent for females. All models with the math test included explained more of the variance for males than for females. In all the models without the math test, except for Restricted Model 1 (background), Restricted Model 6 (background, general attitudes, curriculum and educational aspirations, school attitudes, and attitudes about math), Restricted Model 8, and the full model, more variance was explained for females than for males. This suggests that general attitudes may play a more important role in the Algebra 1 grades of females than of males. For Algebra 2, the full model without the math test explained 54 percent of the variance in males' grades and 46 percent of the variance in females' grades. In the full models with the test, the amount of variance explained for females and males was nearly identical (.54 and .55, respectively). Subject attitudes also appeared to play an important role in Algebra 2 grades.

The full regression models for algebra grades are shown in Tables 21A and 21B. In Algebra 1, only math teachers' comments showed a consistent significant relationship for both genders across both models. It is important to note that although the math test had the strongest relationship with males' Algebra 1 grades of any variable in the full model including test scores, there was no significant relationship between the test score and Algebra 1 grades for females. For males, the only variable significantly related to Algebra 1 grades in models both with and without the test score was having discipline problems. It is noteworthy that, all else being equal, having discipline problems was associated with higher Algebra 1 grades for males. For females, having a nonstereotyped sex-role attitude and having a poor attitude about students who get good grades were significantly associated with higher Algebra 1 grades in both of the full models. In Algebra 2, the only variable in both of the full models significantly associated with grades for both males and females was finding math interesting. Note that teachers' comments and the math test score were significantly associated with Algebra 2 grades for females but not for males. The other variables significantly associated with Algebra 2 grades for females in both of the full models were being in the academic curriculum and spending less time on homework. Comparison of these tables shows the complexity of the factors affecting grading.

One reminder is in order. The High School and Beyond Teacher Comment File did not permit separation of comments by Algebra 1 teachers, Algebra 2 teachers, and geometry teachers. This may have masked important differences in the attitudes of the teachers.

Geometry Grades

As was pointed out earlier, geometry grades differed from the English and algebra grades examined previously in that females received lower grades than males. The mean geometry grades were 2.67 for males and 2.47 for females.

Table 22 shows the squared multiple correlations of geometry grades regressed on the blocks of predictor variables. These blocks represent: a) background,

TABLE 21A

Full Model for Algebra 1 Grades for Males and Females: Standardized and Raw Regression Weights

	Without Math Test				*With Math Test*			
	Males		*Females*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background								
SES	.38*	.71	−.02	−.03	.15	.27	−.02	−.03
Minority	−.00	−.01	−.17	−.37	.08	.23	−.13	−.28
General attitudes								
Self-concept	−.00	−.01	.13	.17	−.12	.21	.14	.19
Locus of control	.05	.07	.25*	.32	.07	.10	.21	.27
Sex-role attitude	.18	.40	.30*	.42	.03	.08	.28*	.40
Curriculum and educational aspirations								
Academic (vs. general)	.06	.14	.11	.22	−.04	−.10	.07	14
Educational aspirations	−.06	−.05	.18	.14	−.13	−.11	.16	.13
School attitudes								
School attitude	.05	.07	−.13	−.18	−.13	−.19	−.11	−.15
Attitude about good grades	.18	.41	−.23*	−.44	.21*	.46	−.24*	−.45
Math attitudes								
Useful	−.01	−.02	−.01	−.02	.00	.01	.01	.02
Interesting	−.08	−.21	−.15	−.31	−.12	−.30	−.16	−.33
Anxiety	−.22*	−.29	−.04	−.05	−.06	−.08	−.04	−.05
School behaviors								
Hours of homework	−.16	−.05	.02	.01	−.13	−.04	.00	.00
Came to class unprepared	.00	.01	−.20	−.42	−.02	−.06	−.20	−.43
Cut class	.12	.38	.16	.44	.16	.53	.15	.41
Days absent, not sick	.12	.04	−.09	−.04	.13	.04	−.08	−.04
Discipline problems	.32*	.95	−.10	−.32	.24*	.72	−.09	−.26
Math teachers' comments composite	.48*	2.18	.27*	1.19	.35*	1.60	.23*	1.01
Math test	—	—	—	—	.68*	.10	.15	.02

*Statistically significant difference.

b) general attitudes, c) curriculum and educational aspirations, d) school attitudes, e) subject attitudes, f) school behaviors, and g) math teachers' comments composite.

In the full models for the total group, 37 percent of the variance in geometry grades was explained by the model excluding the math test and 44 percent by the model including the test.

Table 23 shows the association between gender and geometry grades. When the math test was included in the models, none of the relationships between gender and grades reached statistical significance. Without the math test, the full model and all but two of the restricted models (Restricted Models 6 and 8) showed significant associations between gender and geometry grades. This is the opposite of the finding for Algebra 1, in which all the models that included the math test showed a significant relationship with gender but only some of the models excluding the test showed such a relationship. In contrast to the gender and grade associations seen for English and algebra, this is a positive finding, indicating that males received higher grades than females, even after controlling for the variables in the models. As with algebra, there was relatively little change in the size of the gender–grade association as blocks of variables were added. The drop in the regression coefficients associated with the addition of attitudes about math (block e) and curriculum and educational aspirations (block c) suggests that these variables may play an important role in geometry grades for females.

Comparison of the extent to which the various models explained the geometry grades of females and males can be made by returning to Table 22. This table shows that in the two full models, 42-47 percent of the variance was explained for males and 36-44 percent for females. All the models, both with and without the math test, explained slightly more of the variance in geometry grades for males than for females.

Table 24 shows the variables significantly associated with the geometry grades of males and females in the full models. Here we see that the same three vari-

TABLE 21B

Full Model — **Algebra 2 Grades for Males and Females: Standardized and Raw Regression Weights**

	Without Math Test				*With Math Test*			
	Males		*Females*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background								
SES	.01	.02	−.14	−.20	−.02	−.03	−.21*	−.31
Minority	−.03	−.13	−.15	−.58	−.00	−.00	−.13	−.53
General attitudes								
Self-concept	.02	.03	−.00	−.00	.04	.05	.01	.02
Locus of control	.12	.13	.21*	.30	.12	.13	.07	.09
Sex-role attitude	.18	.28	.02	.02	.14	.22	.06	.08
Curriculum and educational aspirations								
Academic (vs. general)	.14	.29	.30*	.67	.09	.18	.22*	.50
Educational aspirations	.12	.12	−.14	−.10	.06	.06	−.16	−.11
School attitudes								
School attitude	.04	.07	.05	.07	.12	.20	.00	.00
Attitude about good grades	.04	.06	−.11	−.21	.02	.04	−.06	−.11
Math attitudes								
Useful	.21*	.47	.07	.14	.18	.39	.02	.04
Interesting	.30*	.58	.27*	.53	.29*	.55	.23*	.45
Anxiety	−.20*	−.26	−.11	−.12	−.14	−.18	−.04	−.05
School behaviors								
Hours of homework	.20	.05	−.25*	−.07	.20	.05	−.21*	−.06
Came to class unprepared	−.02	−.04	.08	.23	−.01	−.02	.07	.20
Cut class	−.11	−.29	.10	.25	−.07	−.20	.18	.45
Days absent, not sick	−.09	−.03	−.04	−.03	−.06	−.02	−.12	−.09
Discipline problems	.19	.49	−.08	−.47	.19	.50	−.08	−.47
Math teachers' comments composite	.14	.65	.57*	2.85	.14	.66	.46*	2.28
Math test	—	—	—	—	.19	.02	.41*	.05

*Statistically significant difference.

ables, math teachers' comments, anxiety about math, and educational aspirations, were significantly associated with geometry grades for both females and males, in models with and without the math test. Positive teachers' comments and high educational aspirations were associated with higher geometry grades, while anxiety about math was associated with lower geometry grades. For males in both models, being a minority was also associated with lower geometry grades; this association was significant for females only in the model without the test score. For females, cutting class was positively and significantly associated with geometry grades, all other things equal, but this is likely a statistical artifact since the correlation is negative.

In summary, geometry grades presented a different picture than algebra grades. In geometry all the models explained more of the variance in males' grades than in females' grades. Geometry presented a consistent picture of key variables associated with grades. For both males and females, teachers' comments, educational aspirations, and anxiety about math played significant roles.

Teachers' Comments, Test Scores, and Grades

Because a major impetus for this study was to investigate some of the reasons why females tend to receive better grades than males in high school but obtain somewhat lower test scores, the regressions related to teachers' comments, test scores, and grades are reviewed together in detail. These regressions, summarized in Table 25, come from the full models that included the High School and Beyond tests. The correlations in Table 3 showed that test scores had a stronger relationship with males' grades than with females' grades in every subject. The correlations in Table 6 showed that teachers' comments had a stronger relationship with males' English grades than with females' English grades; the reverse was true in geometry, in which teachers' comments were more strongly related to females' grades. The question now is whether controlling for the other variables in the full model changes these relationships.

TABLE 22

Multiple Correlations (Squared) of Geometry Grades Regressed on Blocks of Predictors

Model	*Blocks Included*	*Without Math Test*			*With Math Test*		
		Males	*Females*	*Total*	*Males*	*Females*	*Total*
Restricted 1	a	.07	.02	.04	.25	.20	.23
Restricted 2	a,b	.12	.06	.08	.26	.23	.25
Restricted 3	a,b,c	.23	.14	.17	.34	.27	.29
Restricted 4	a,b,d	.16	.08	.11	.32	.25	.27
Restricted 5	a,b,c,d	.24	.15	.18	.37	.28	.31
Restricted 6	a,b,c,d,e	.33	.26	.20	.41	.34	.36
Restricted 7	a,b,c,d,f	.25	.17	.20	.39	.31	.33
Restricted 8	a,b,c,d,e,f	.34	.27	.29	.42	.36	.37
Full	All (a–g)	.42	.36	.37	.47	.44	.44

In every subject, all other things equal, males' grades were more strongly associated with test scores than with teachers' comments. This suggests that males were more likely to be evaluated on their achievement than on teachers' perceptions of them. This type of evaluation is in keeping with the prescriptive literature on grading, which emphasizes that grades should be based solely on achievement—the acquisition of knowledge and skills (Stiggins, Frisbie, and Griswold 1989). Females appeared to be evaluated on the basis of achievement in English, where their grades were strongly associated with the verbal test composite. However, females' math grades, in both Algebra 1 and Algebra 2, were more strongly associated with teachers' perceptions than with their math test score. In geometry, females' grades were equally associated with teachers' comments and with the math test score.

Discussion and Conclusions

Because teachers' comments played a major role in grades in all subjects and for both males and females, possible determinants of the relationship between these comments and gender differences were investigated first for each subject before proceeding to the analysis of grades. The full conceptual model that included background, curriculum, educational aspirations, attitudes, behaviors, and test scores explained more of the variance in English teachers' comments about males than about females and more of the variance in math teachers' comments about females than about males. This suggests that other gender-related variables, not included in this analysis, were affecting these comments. It also suggests that teachers' expectations for males and females in each subject may affect their comments about students.

In English, teachers' comments about both males and females were positively associated with verbal test scores and positive school attitudes; they were negatively associated with having discipline problems and being anxious in English class. The relationships between both the verbal test composite and anxiety and English teachers' comments were stronger for males than for females. For females, all else equal, high educational aspirations and an internalized locus of control were significantly and positively associated with English teachers' comments, while cutting class, holding nonstereotyped sex-role attitudes, and believing that English will be useful in the future were significantly associated with negative comments. For males, being absent when not sick was negatively related to English teachers' comments.

In math, teachers' comments were positively associated with High School and Beyond math test scores for

TABLE 23

Standardized and Raw Regressions of Gender on Geometry Grades for Each Model

Model	*Blocks Included*	*Without Math Test*		*With Math Test*	
		Standardized	*Raw*	*Standardized*	*Raw*
Restricted 1	a	.11*	.23	.05	.10
Restricted 2	a,b	.13*	.28	.05	.11
Restricted 3	a,b,c	.08*	.17	.02	.04
Restricted 4	a,b,d	.15*	.32	.07	.15
Restricted 5	a,b,c,d	.10*	.21	.04	.09
Restricted 6	a,b,c,d,e	.06	.12	.02	.04
Restricted 7	a,b,c,d,f	.12*	.25	.07	.15
Restricted 8	a,b,c,d,e,f	.07	.14	.04	.09
Full	All (a–g)	.08*	.17	.05	.11

*Significant *T*-statistic.

TABLE 24

Full Model for Geometry Grades for Males and Females: Standardized and Raw Regression Weights

	Without Math Test				*With Math Test*			
	Males		*Females*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background								
SES	−.08	−.14	−.02	−.02	−.10	−.17	−.02	−.02
Minority	−.26*	−.83	−.14*	−.45	−.20*	−.64	−.08	−.24
General attitudes								
Self concept	−.05	−.07	.08	.11	−.05	−.06	.06	.10
Focus of control	.08	.11	.07	.11	.00	.00	.07	.10
Sex-role attitude	.03	.06	−.02	−.03	.02	.04	−.05	−.08
Curriculum and educational aspirations								
Academic (vs. general)	−.06	−.15	.06	.14	−.06	−.15	.01	.02
Educational aspirations	.25*	.22	.15*	.14	.20*	.17	.10*	.09
School attitudes								
School attitude	−.01	−.02	.06	.09	.02	.03	.06	.10
Attitude about good grades	−.02	−.04	.05	.11	.02	.03	.02	.03
Math attitudes								
Useful	.03	.06	−.01	−.03	.00	.00	−.04	−.10
Interesting	.03	.07	.08	.17	.03	.05	.06	.13
Anxiety	−.32*	−.40	−.23*	−.27	−.23*	−.29	−.16*	−.19
School behaviors								
Hours of homework	−.00	−.00	−.07	−.02	.03	.01	−.02	−.01
Came to class unprepared	−.01	−.03	.08	.18	−.05	−.11	.01	.01
Cut class	.06	.17	.08	.22	.03	.10	.11*	.30
Days absent, not sick	−.02	−.01	−.05	−.03	.05	.02	−.04	−.02
Discipline problems	−.07	−.22	.06	.28	−.09	−.28	.06	.25
Math teachers' comments composite	.29*	1.34	.35*	1.74	.25*	1.12	.32*	1.60
Math test	–	–	–	–	.31*	.04	.32*	.05

*Statistically significant difference.

both males and females and negatively associated with having disciplinary problems. The relationship between math test scores and math teachers' comments was stronger for males than for females, while the relationship between having discipline problems and teachers' comments was stronger for females. All else equal, females received significantly more positive math teachers' comments when they spent more time on homework and significantly more negative comments if they were anxious in math class and believed that math would be useful in their future. Males received significantly more positive math teachers' comments, controlling for all other variables, if they had high educational aspirations and a positive attitude toward students getting good grades; they received significantly more negative comments when they cut class. Review of the factors significantly associated with math teachers' comments about females, but not significant for males, suggests that math teachers may expect females to spend more time on homework than males. These data also suggest that math teachers were more negative about math anxiety in females than in males and that they were somewhat negative about females who anticipated math would be useful in the future. For males, math teachers appeared to place more emphasis on educational aspirations, attitudes about students getting good grades, and not cutting class. For both genders, high test scores and not having discipline problems were important, but test scores were more important for males while behavior was more important for females.

TABLE 25

Summary of Standardized Regressions of Teachers' Comments and Tested Achievement on Grades

	Teachers' Comments		*Tested Achievement*	
	Males	*Females*	*Males*	*Females*
English grade	.29*	.30*	.36*	.42*
Algebra 1 grade	.35*	.23*	.68*	.15
Algebra 2 grade	.14	.46*	.19	.41*
Geometry grade	.25*	.32*	.31*	.32*

*Statistically significant difference.

After examining the teachers' comments, the analysis turned to a consideration of how much of the

variance in the English, algebra, and geometry grades of college-bound high school sophomores could be explained by student background, curriculum and aspirations, attitudes (general, school, and subject), school behaviors, and teachers' perceptions of these students. For the total group of males and females, the full model (including test score) explained 46 percent of the variance in English grades, 42 percent in algebra grades, and 44 percent in geometry grades. Thus it can be concluded that this model was effective in identifying many of the determinants of high school English and math grades.

The second concern was whether the significant gender differences seen in English and Algebra 1 grades would persist after controlling for all the variables in the full model with test scores and if this model would further reduce the nonsignificant gender differences in Algebra 2 and geometry grades. The model reduced the gender differences in English grades somewhat, but a significant negative relationship between gender and English grades persisted. The model did not reduce the relationship between gender and Algebra 1 grades; here also a significant negative relationship persisted. This suggests that some variable not included in the model was associated with the lower grades received by males in these two subjects. The model did further reduce the already nonsignificant relationship between Algebra 2 grades and gender but it had little impact on the relationship between gender and geometry grades. Exclusion of test scores from the full model changed some of these results. Without the verbal test composite, the negative association between gender and English became nonsignificant in the full model; this may be related to the fact that the High School and Beyond test battery did not test written composition. Algebra 1 grades retained their significant negative association with gender and the association between gender and geometry grades became positive and significant. The relationship between gender and Algebra 2 grades remained nonsignificant. It is unclear whether these changes were related to the characteristics of the High School and Beyond tests or if they were simply a reflection of the importance of achievement in the assignment of grades.

A third consideration was whether there were gender differences in the amount of variance in grades explained by the full model. The full model, with test scores, explained considerably more of the variance in males' grades than in females' grades in both English and Algebra 1, but only slightly more of the difference in Algebra 2 and geometry grades. One reason why more of the variance in males' grades was explained appears to be that these grades were more strongly associated with what the High School and Beyond tests measure than with teachers' comments. Another reason may be the different attitudes and behaviors significantly associated with grades for females and for males.

The full model regression analysis with the verbal test composite showed that, all else equal, females' grades in English were significantly associated with positive school attitudes, not being anxious in English class, and holding sex-stereotyped attitudes. While males' English grades were also significantly associated with not being anxious in class, they were also significantly related to being white, having high educational aspirations, not coming to class unprepared, and not believing that English would be useful in the future. For Algebra 1, the full model regression analysis with the test score showed females' grades significantly associated with having nonstereotyped sex-role attitudes and with not having a positive attitude about students getting good grades. For males, Algebra 1 grades were significantly associated with having a positive attitude about students getting good grades (opposite to the finding for females), as well as with having discipline problems. In Algebra 2, where there were no significant gender differences in grades, finding math class interesting was significant for both females and males; for females, having low socioeconomic status, being in the academic curriculum, and doing less homework were also significant. In geometry, the other math course displaying no significant gender differences in grades, educational aspirations and not being anxious in class were significantly related to grades for both females and males. For males, being white was also significantly associated with geometry grades, while for females, cutting class was significantly associated with geometry grades.

Perhaps even more important, neither High School and Beyond math test scores nor teachers' comments were associated with Algebra 2 grades for males, although both were significant for females. In Algebra 1, the High School and Beyond math test was significantly associated with grades for males but not for females. The confusing relationship between the High School and Beyond math test and algebra grades may have been due in part to the content of the test, especially since it did not test specific skills in algebra.

One possible explanation for these differences is that teachers had very different expectations for females and males in the classroom. There is a hint in the teachers' comments, and to a lesser extent in the grades assigned, that teachers' differential expectations about the appropriateness of their subject for males and females may have affected their perceptions of the students and/or their beliefs in traditional sex roles. For example, females who held nonstereotyped sex-role attitudes received significantly lower grades in English and also significantly more negative comments from English teachers. In contrast, males who held non-

stereotyped attitudes were more likely to receive negative comments from math teachers. English teachers' comments were significantly more positive for females who had high educational aspirations, while math teachers' comments were more positive for males with such high aspirations. Females who expected that English and math would be useful in their future received more negative comments from both groups of teachers, all else equal.

The results for the total group show that gender remained significantly associated with teachers' perceptions of students, with males receiving more negative comments from both math and English teachers, even after controlling for all of the variables in the full model.

It can be concluded that the model developed for this study, while explaining a large amount of the variance in high school grades, was not entirely adequate to explain gender differences in grades. Apparently gender or a gender-associated variable unmeasured in this study played a significant role in teachers' perceptions of college-bound tenth-grade students and, even after controlling for these different perceptions, in the grades that students received in English and in Algebra 1. The observed gender differences in these high school courses could not be entirely explained by differences in the background, attitudes, and behaviors of college-bound high school students.

Work in progress by Lewis and Smith (n.d.) weighs the importance of 24 factors considered by teachers in assigning high school English grades. Their study allows a comparison between the variables included in our models and the factors that high school English teachers say are important to them when grading. Lewis and Smith have found that the factor most important to teachers was whether a student cheated on a test or in the preparation of materials outside of class. There was no information in the High School and Beyond Teacher Comment File about whether or not the teacher saw a student as honest and unlikely to cheat. While there is no reason to assume that cheating is more common in one sex than the other, teachers' beliefs about students' honesty represent a variable missing from this study's models that may be related to the remaining unexplained gender differences in grades.

According to the Lewis and Smith study, next most important to teachers was whether students had extensive absences from class. Since both unexcused absences and cutting class were included in the models for this study, absences are not a possible explanation for the remaining gender differences in grades. The third most important factor in English teachers' grades was the perception that the student worked hard. This variable is probably covered by the Teacher Comment File item about whether or not the student was working to potential and, therefore, is not a likely explanation for the remaining gender differences in grades. The student's level of mastery, ranking fourth among the factors affecting English teachers' grades in the Lewis and Smith study, was only partially covered in the models including the High School and Beyond tests. Other aspects of mastery, not measured by these tests, may be an additional source of variance.

Handing in written materials, such as homework and other assignments, on time ranked fifth in the factors affecting English teachers' grades. This is a variable not included in the High School and Beyond data, neither in the Teacher Questionnaire nor in the Student Questionnaire, and is a possible source of the remaining gender differences in grades. Females spend more time on homework and are more likely to come to class with their homework completed, so it seems likely that they would also be more apt to turn in homework and other assignments on time.

Lewis and Smith have found that the desire of teachers to maintain a standard of excellence ranked sixth in importance among the factors affecting English grades. This teacher attitude was not included in the models or in the High School and Beyond Teacher Comment File, but it is unlikely to have a differential effect on male and female students.

The quality of student work on classroom tests and on material prepared outside of class were also important components of English teachers' marks. These were not included in the models for this study and may be related to the remaining gender differences in grades. Teachers' classroom tests are likely to emphasize things not covered in the High School and Beyond tests. The fact that males pay less attention to homework has already been noted, so it would not be surprising to find their homework of poorer quality. Closely related to classroom tests and assignments is the teacher's perception of improvement on the part of the student, another variable not included in our models.

Lewis and Smith report that students' attitudes were ranked ninth in importance as factors in English teachers' marks. A variety of attitudes were included in the models in this study. It is unclear which other attitudes would be sufficiently important to contribute to gender differences in grades.

Conformity to prescribed style in preparing written work was ranked tenth among the 24 factors considered by English teachers in assigning grades. This was not included in our models and is a possible explanation for the remaining gender differences in grades. Neat handwriting may be seen as part of this conformity. Sloan and McGinnis (1982) found that handwriting significantly affected teachers' grading of high school es-

says. Since females tend to have neater handwriting than males, this may also be entering into the grading equation.

Twelfth on the list of important factors considered by English teachers in assigning marks, according to Lewis and Smith, was creativity, another variable not included in our models.

Thus the remaining gender differences in grades may be related to differences in students' performance on classroom tests and written assignments, promptness or tardiness in handing in assignments, improvement during the course, conformity to prescribed style for writing assignments, and/or creativity.

Still other possible explanations for the remaining significant gender effects in teachers' comments and in English and algebra grades include: (1) student abilities and achievement (such as written composition or other skills relevant to achievement not included in the High School and Beyond tests) and attitudes and behaviors not measured in this study but directly affecting grades; (2) student attitudes and behaviors not measured in this study that affect teachers' perceptions of students and, by this indirect process, their grades; and (3) differential teacher attitudes and expectations for females and males.

The first of these explanations is likely to be sound, especially in regard to English grades, since the High School and Beyond tests were all multiple choice and did not require students to produce written essays. The limitations of the tests may have been involved in the geometry grade correlations, although when the High School and Beyond math test was included in the models, the gender differences were not statistically significant. Some would argue that the remaining gender differences in geometry grades may be related to differences in spatial ability. It would be possible to test this hypothesis using High School and Beyond data because two spatial tests, Mosaic Comparisons and Visualization in Three Dimensions, were administered in 1980. However, the much stronger effect of teachers' comments on females' than on males' geometry grades suggests that gender differences involve teachers' perceptions rather than differences in particular math abilities.

Two student behaviors that may affect grades indirectly by reducing the time students spend on homework are watching TV and employment. However, Wiggins (1987) found no significant relationship between earned grades and watching TV. Wirtz (1987) concluded that intense part-time employment (defined as more than 20 hours a week) was linked to lower grades.

A gender-associated variable that may affect grades indirectly through teacher perceptions is "cultural capital." DiMaggio (1982) found that students' cultural attitudes and interests (such as visiting art galleries, interest in symphony concerts, etc.), had a significant influence on high school grades in English, history, and mathematics, even after controlling for student ability and for father's education. Moreover, according to this study, the returns on cultural capital differed by gender. All women benefited from cultural capital but the gains in grades were greatest for women from families of high socioeconomic status. In contrast, only men from families of middle and lower socioeconomic status benefited from cultural capital. Cultural capital may affect grades directly or it may work indirectly by altering teachers' perceptions of students.

A broader conceptualization of cultural capital, based on a cultural resources/social interaction model of gatekeeping, has been used by Farkas, Grobe, Sheehan, and Shuan to predict course work mastery and grades for seventh- and eighth-grade students. This model, which includes students' and teachers' background characteristics; students' basic skills; absenteeism; teachers' judgments of students' work habits, disruptiveness, and appearance; course work mastery; and grades "almost completely accounts for the course-grade differentials observed for gender, ethnicity, and poverty groups" (1990, 127). Teachers' judgments of students' work habits was the most important predictor, followed by cognitive performance. The authors concluded that "teacher judgments of student noncognitive characteristics are powerful determinants of course grades, even when student cognitive performance is controlled" (1990, 140).

Teachers' expectations, such as gender-specific expectations (believing that girls usually do better than boys in school) or gender-by-subject expectations (believing that English is a subject in which females "should" do better than males and that geometry is a subject in which males "should" do better than females), also enter the analytic picture. Variations in gender-by-subject expectations seem especially likely, given the differences in the student characteristics important for grades that, in this analysis, tended to vary by subject as well as by gender.

Subject-by-subject variations may be due to differences in the grading attitudes and practices adopted by teachers as they are socialized to their disciplines. Research at the college level by Kodras and Prather concluded that:

> Faculty opinions about grading are strongly associated with academic discipline. Faculty in those disciplines which emphasize factual and cumulative course content tend . . . to emphasize written tests and quizzes to evaluate students, and express confidence in the letter-based grading system. Faculty members in fine arts, education, and the health professions tend to have less confidence

in the conventional grading system, hold that a "B" grade indicates average performance, and use non-quantified factors—such as attitude and effort—in assigning student's grades. (1978)

In summary, this study examined the variables associated with gender differences in high school English and math grades. The conceptual model that was developed explained about 40 percent of the variance in these grades. Controlling for the variables in the model did not eliminate the statistically significant gender differences in English and Algebra I grades. Possible student variables that may be related to gender differences in grades include differences in grade-relevant skills that are not assessed by the High School and Beyond tests, as well as differences in the quality of students' work on classroom tests and assignments, promptness in handing in assignments, improvement during the course, conformity to the prescribed style for assignments, and creativity. Possible variables affecting grades indirectly through teachers' perceptions of students include cultural capital and teachers' expectations. It seems likely that expectations play an important role, because there are subject differences in the variables associated with good grades.

In concluding this discussion of grades and teacher's comments, it should be stressed that these results have been obtained on a very selective sample of high school students—those who were college-bound. It is possible that the results would differ if the entire high school population were included in the analysis.

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Appendix: Alternative Analysis

At the beginning of the relational analysis, there was concern about the multicollinearity of the variables. To deal with this problem, the following analysis was undertaken. First the explanatory variables were factor-analyzed. Comparable factors for females and males could be obtained only in a three-factor solution, although the roots indicated more than three factors should be extracted. The three factors were: (1) attitudes about students who get good grades (reliability .85); (2) positive attitudes and behaviors (self-concept, parental involvement in students' education, educational aspirations, being seen by others as a good student, coming to class prepared) (reliability .64); and (3) nonnegative attitudes and behaviors (not cutting class, not absent when not sick, time spent on homework, work less important than school, less time spent driving around, thinks math will be useful in the future [reliability .57 for males, .50 for females, .54 total]). Composite variables were created using variables that loaded .30 or higher on each factor. One variable—coming to class prepared—loaded on both the positive and the nonnegative attitudes and behaviors factors. These three composite variables were then entered into the regressions along with background characteristics (sex, race/ethnicity, and socioeconomic status), curriculum (academic versus general and vocational), the verbal test composite, the math test, and, in the case of grades, the appropriate teachers' comments composite.

The results, presented in Tables A-1, A-2, A-3, and A-4, showed a significant effect of gender on teachers' comments (more negative for males), even after controlling for the other variables. The results also showed a significant effect of gender on English grades (more negative for males) even after controlling for the other variables. There was no significant relationship between gender and math grades when algebra and geometry grades were combined (separate analyses were not run).

The results also showed a different pattern of variables significantly associated with teachers' comments for males and females in both English and mathematics. In English, nonnegative attitudes and behaviors were significant for both sexes, but verbal ability was significant for males only, while positive attitudes and behaviors were significant for females only. In math, tested math achievement and positive attitudes and behaviors were significantly related to teachers' comments for both females and males; however, socioeconomic status, verbal ability, and attitude about students who get good grades were also significant for males, while for females, nonnegative attitudes and behaviors were significant.

In English, the same set of variables—verbal test score composite, math test, positive attitudes and behaviors, and teachers' comments—were significantly associated with grades. For males, but not females, minority racial/ethnic status was also significantly and negatively related to English grades, even after controlling for the other variables. In math, the math test, positive attitudes and behaviors, nonnegative attitudes and behaviors, and teachers' comments were significantly related to grades for both males and females. It should be noted, however, that the relationship between the High School and Beyond math test and math grades was much stronger for males than for females, while the teachers' comments variable had a much stronger association with math grades for females than males. For males, not being in the academic curriculum and having a positive attitude toward students who get good grades were also significantly associated with math grades; for females, the verbal test composite was significantly associated with math grades.

One problem in this analysis was determining just how each of the various components of the attitudes and behaviors composite variable was affecting the relationships with teachers' comments and grades. For this reason, the total model analysis reported above was undertaken. In addition, the differential reliability of the nonnegative attitudes and behaviors composite for females and males caused some concern as did the appearance of one variable (coming to class prepared) on both the positive and the nonnegative composite. Finally, forcing the explanatory variables into factors when the structure of these variables tended to differ by gender appeared unwise because it might have masked important gender differences in the relationship between students' attitudes and behaviors and the grades they received.

TABLE A–1

English Teachers' Comments	*Total*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background						
Sex (male)	–.12*	–.05				
Race/ethnicity	.01	.00	.05	.04	–.03	–.02
SES	–.04	–.01	–.02	–.01	–.05	–.01
Curriculum (academic)	.03	.01	.03	.01	.03	.01
Verbal composite	.14*	.00	.21*	.01	.09	.00
Math test	.09*	.00	.10	.00	.08	.00
Attitude about good grades	.07*	.02	.06	.01	.07	.02
Positive attitudes and behaviors	.16*	.07	.05	.02	.23*	.09
Nonnegative attitudes and behaviors	.16*	.07	.23*	.10	.09*	.04
R^2	.20		.22		.16	

*Significant *T*-statistic.

TABLE A–2

English Grade	*Total*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background						
Sex (male)	–.09*	–.17				
Race/ethnicity	–.03	–.06	–.08*	–.21	.02	.04
SES	.01	.02	–.02	–.03	.04	.05
Curriculum (academic)	–.03	–.06	–.04	–.08	–.02	–.03
Verbal composite	.23*	.02	.22*	.03	.24*	.02
Math test	.22*	.02	.25*	.02	.21*	.02
Attitude about good grades	.01	.01	.00	.00	.03	.03
Positive attitudes and behaviors	.18*	.30	.19*	.32	.18*	.23
Nonnegative attitudes and behaviors	–.02	–.04	–.00	–.00	–.04	–.08
English teachers' comments	.31*	1.20	.31*	1.13	.31*	1.27
R^2	.47		.51		.41	

*Significant *T*-statistic.

TABLE A–3

Math Teachers' Comments	*Total*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background						
Sex (male)	–.09*	–.04				
Race/ethnicity	.04	.03	.04	.03	.05	.03
SES	–.04	–.02	–.11*	–.04	.02	.01
Curriculum (academic)	–.03	–.01	–.02	–.01	–.03	–.02
Verbal composite	.11*	.00	.17*	.01	.02	.00
Math test	.16*	.00	.15*	.00	.21*	.01
Attitude about good grades	.06*	.01	.08*	.02	.03	.01
Positive attitudes and behaviors	.11*	.05	.12*	.06	.11*	.04
Nonnegative attitudes and behaviors	.09*	.04	.05	.02	.13*	.02
R^2	.35		.36		.35	

*Significant *T*-statistic.

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TABLE A–4

Math Grades	*Total*		*Males*		*Females*	
	Standardized	*Raw*	*Standardized*	*Raw*	*Standardized*	*Raw*
Background						
Sex (male)	–.03	–.06				
Race/ethnicity	–.05*	–.15	–.07	–.22	–.06	–.17
SES	–.02	–.04	–.01	–.03	–.07	–.11
Curriculum (academic)	–.08*	–.18	–.09*	–.20	–.06	–.15
Verbal composite	.13*	.02	.05	.01	.20*	.03
Math test	.28*	.03	.40*	.05	.16*	.02
Attitude about good grades	.03	.04	.11*	.13	–.03	–.03
Positive attitudes and behaviors	.18*	.35	.21*	.47	.18*	.32
Nonnegative attitudes and behaviors	–.10*	–.21	–.11*	–.23	–.13*	–.27
Math teachers' comments	.30*	1.40	.23*	1.05	.37*	1.76
R	.58		.62		.58	

*Significant *T* statistic.